

A HISTORICAL EXCURSUS INTO THE DEVELOPMENT OF THE CLASSROOM SYSTEM OF EDUCATION IN THE SCHOOL NATURAL SCIENCE EDUCATION SECTOR OF UKRAINE IN 1959-2020

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Abstract:

The article presents the historical development of the classroom system of natural subjects. It describes changes in the provision of classrooms with equipment, which led to changes in the methodology of teaching natural sciences. The author discovers the importance of combining an experiment with virtual experiments in cases where it is impossible to conduct an experiment.

Keywords: classroom system, school education, teaching aids, teaching methods, equipment for experiments.

The purpose of the article is to provide a historical excursus into the development of the classroom system. The author substantiates the need to fully provide classrooms and laboratories with equipment for pupils' practical learning of scientific research methods.

After the Verkhovna Rada of the Ukrainian Soviet Socialist Republic adopted the law «On Strengthening the Relationship of School with Life and on the Further Development of the Public Education System in the Ukrainian Soviet Socialist Republic» in 1959, the expansion of the educational and material base

of classrooms and the creation of appropriate workshops and classrooms with laboratories began at an accelerated pace in secondary schools. The education authorities and schools tried to fulfill this task. Increasing attention was paid to the provision of equipment for science classrooms to raise the level of teaching of these subjects and electives. As a result of changes in the structure of teaching, a classroom system gradually appeared in general education schools [4; 6; 8].

Methodologists and scientists, by their example, were engaged in solving the issue of modernizing the equipment of classrooms. Teachers also contributed to changes in the methodology of teaching natural subjects in accordance with the scientific and technical process [1].

After Leonid Brezhnev came into office, the education system built before him was gradually destroyed. It was proposed to return to 10-year education, abolish industrial training, and dispose of its material and technical base.

When planning school hours in the schools of the Ukrainian SSR, everything was done to bring them closer to those of the Russian Federation.

According to the decree of the Central Committee of the Communist Party of the Soviet Union and the Council of Ministers of the USSR dated November 19, 1966, «On Measures to Further Improve the Work of Secondary Schools,» schools were granted the right to conduct optional classes to deepen pupils' knowledge of natural, physical, mathematical, and humanitarian sciences. However, this decree did not have adequate funding for the implementation of proper provision of the material and technical base.

The formation and consolidation of the classroom system of education in 1972-1977 as a rational form of organizing classes marked a new stage in the development of the national school.

The provision of natural science classrooms was politicized. New equipment was initially provided to Russian-language schools. Rural schools received equipment on a residual basis. The equipment was not always technically perfect. It was during this period that teachers and scientists began to flourish in their efforts to improve this equipment for full use in lessons. There were cases when teachers, during extracurricular activities, created together with pupils not only demonstration equipment but also sets for performing laboratory work individually, in pairs, or groups in the classroom [1]. It is worth noting that in these programs there was a shift away from providing examples of military equipment.

As a result of the work done in the 1979-1980 academic year, about 96% of secondary schools and 70% of eight-year schools used the classroom system of

education. At the end of 1980, there were more than 144 thousand classrooms in secondary schools of the Ukrainian SSR, and each classroom had at least 10 items of technical equipment, such as film and graphic projectors, epidiascopes, TV sets, tape recorders, etc. [3, p. 54, 69].

From 1981-1982, the Ministry of Education of the USSR and the Ministries of Education of the Union Republics defined and began to implement a new and unified level of general secondary education.

When teaching humanities and natural sciences, teachers introduced pupils to territorial and production complexes, the use of natural resources, processes in nature, biological theories (Darwin, cellular), and the application of biological knowledge in the practice of agriculture, medicine, microbiology, industry, and political life of states, focusing on the study of several V.I. Lenin's works and the Constitution of the Soviet Union. [5, 7]. In this way, communist ideology combined with the information that heavy industry was the basis of the material and technical base of communism was imposed.

The end of the 1970s and the entire decade of the 1980s showed the «full glory» of the Soviet planned provision of school equipment. The most significant results of providing equipment to natural science classrooms were achieved in Kharkiv, Donetsk, Dnipropetrovsk, and Sumy regions. Schools in other regions could get the necessary equipment at the regional supply center only through connections and bribes. Only those teachers who were interested in it and visited the regional center more often had the opportunity to get the equipment they needed. At the same time, we should not forget about the attitude of school administrations towards these teachers and their friendly relations with the heads of collective farms or the nomenclature elite of district centers, and that the process of distributing equipment to classrooms was ideologized. Only in this case, the teacher could take everything that he or she needed and provided that it was in stock. The equipment could arrive later, after some time. Equipment was delivered to the base periodically, and the closer the end of the USSR was, the more difficult it was to get equipment even through backstairs influence. Curricula and programs were constantly revised.

At the same time, in the 1980s, the Ministry of Education and the Ministry of Health of the USSR developed and adopted some resolutions and methodological recommendations of various kinds, the main purpose of which was to create the preconditions for the introduction of standard classrooms into educational practice. These include: «Building Norms and Rules for Secondary Schools and Boarding Schools», «Standard Lists of Teaching and Visual Aids and Educational Equipment for Secondary Schools», «On the Use of School Furniture», etc.

In the 1980s, lessons of generalization and systematization of knowledge and skills became increasingly popular among science teachers. The acceleration of the process of forming pupils' skills by using slides for an overhead projector is evidenced by the creation of a block of technical teaching aids in the science classroom.

Skills of improving knowledge and forming experimental skills were no longer relevant. There was a lack of simple devices for laboratory and demonstration work. This phenomenon began to manifest itself most clearly in rural schools. As a result, natural science classrooms were combined in various formats. For example, a physics classroom was joined with a labor-training classroom, or a biology classroom was joined with a geography classroom.

After 1984, a new curriculum and programs were introduced, based on a consistent and rational distribution of theoretical material by degree of study with an increase in the ideological and theoretical level of courses. The number of mandatory hours of classes was reduced, but the time for electives of pupils' choice was increased with the introduction of generalization classes. The number of Ukrainian-language schools in Ukraine sharply decreased.

In 1985-1991, new approaches to the formation of educational content began to be introduced and there was a tendency to weaken party-state censorship in connection with the transition from totalitarianism to pluralism.

The improvement of the content of school education during this period was primarily associated with the «main directions of the reform of general education and vocational schools» (1984). The number of hours for geography, biology, physics and chemistry, Russian language, and literature was reduced again. In secondary schools, pupils were allowed to choose elective classes according to their interests and abilities to study the chosen subject in depth.

In 1990, the shift away from the single school began. The Ministry of Education of the Ukrainian SSR issued curricula for specialized schools with in-depth study of certain subjects. Gymnasiums and lyceums with in-depth study of social sciences, arts and music, physics and mathematics, chemistry and biology, and other areas and cycles began to be established. The peak of the rise of vocational education was over. The introduction of differentiated programs began.

In the 1990s, theoretical materials (problem solving, lectures) became increasingly popular. Collections of ready-made notes from that period were full of such types of lessons. The methodological literature also offered lessons in a game form. Even extracurricular thematic events became similar to theoretical evenings. At such thematic evenings, team members competed in wit and

erudition, not in polytechnic competence.

Unfortunately, the number of items in the typical lists of equipment for physics, chemistry, and biology classrooms was decreasing. In the late 1990s, attention was paid more often to addressing the issue of returning the experiment to the educational environment and updating the material and technical base, but no further progress was made.

It was difficult to fulfill the requirement of the school physics curriculum to allocate 16% of the class time for laboratory work and pupil workshops in those conditions. It was also difficult to meet a similar requirement in the chemistry and biology curricula [2]. The reduction in the number of hours for science subjects and the lack of updating of material and technical equipment caused the greatest loss in science education: observation of phenomena, conducting experiments, laboratory work, workshops, and solving experimental tasks.

In the 1990s, the priority for providing schools with educational and material resources was to replenish schools with computers, computer classrooms, educational software, and digital textbooks. A new «Standard list of educational and visual aids and technical teaching tools for schools of the first, second, and third stages» was approved. The number of units of laboratory equipment and handouts was specified based on 30 pupils per class. According to this list, schools were forced to provide technical equipment through targeted supplies at the expense of state and regional budgets.

In practice, a slightly different picture was observed. Schools received almost no technical teaching aids or chemicals for practical and laboratory classes. There was a significant reduction in the number of secondary schools, as well as a decrease in the number of classrooms and research plots due to the reduction in the total number of schools. In addition, the material and technical base and number of classrooms and research plots in existing schools decreased, especially in rural schools, and were often weak.

In 1999, the Cabinet of Ministers of Ukraine adopted a resolution on the Comprehensive Program of Measures for the Development of Secondary Education for 1999-2012. Along with the positive changes in the school system, no adequate attention was paid to addressing many of the shortcomings of education.

The supply of technical equipment to schools had a positive impact on pupils' perception of the world around them, but it also led to the replacement of practical experiments, laboratory work, and practical work with interactivity, which in turn has a negative impact on practical, native skills. The experience of using

computer models as an alternative to demonstrations and laboratory work by pupils shows the disadvantages of such use of IT. It is worth focusing on the use of IT only in those topics that cannot be taught by direct teaching, for example, lessons on nuclear physics.

When comparing the period from 2000 to 2016 of the twenty-first century with the 1990s, there are no particular differences, except for the following: teachers actively use ready-made lessons from the Internet and conduct experiments in class using equipment created from improvised means; classrooms are provided with CDs and DVDs with computer simulations and videos of chemical, physical, and biological processes, respectively.

The amount of equipment was reduced by eliminating obsolete and difficult-to-maintain laboratory equipment, which was excluded from the list of subjects in the school curriculum. There was an almost complete lack of supply of instruments and equipment to schools, without which it was impossible to study the basics of natural sciences.

In the late 1990s and early 2000s, most theoretical scientists were already advocating further simplification of the school curriculum in the natural sciences. There were almost no practical teachers and innovative teachers left.

Since 2016, the standard list of equipment for natural science classrooms has been updated. Natural science classrooms must be equipped with computer and multimedia equipment in the required quantity, with characteristics not lower than the minimum specified in the standard list. Natural science classrooms must be provided with digital measuring and demonstration equipment, have laboratory kits with the ability to connect digital equipment for laboratory work, etc. It is already clearly stated that technical teaching aids and IT should be used only in combination with classical experiments in science classes.

Since 2020, STEM has been officially introduced. Although publications on the introduction of STEM in teachers' materials in periodicals began to appear in 2018, as well as the introduction of courses in robotics began.

It was only after the official support of the Ministry of Education and Science of Ukraine that STEM was also noticed locally (by school administrators and local education departments). The allocation of funds from local budgets to equip general secondary education institutions began.

Equipping schools with the necessary school equipment is a very important component of a high-quality and successful pedagogical process. A competent approach to the study of natural sciences should be coordinated and aimed at simplified perception through the use of not only digital technologies but also

other appropriate equipment for practical laboratory work and experiments.

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